Name - D.M.S.S.Dissanayake Index No - 190155L

In [ ]:
```
# Question 1
for i in range(1,6):
  print(i, ': ', i**2)
```

```
1 :  1
2 :  4
3 :  9
4 :  16
5 :  25
```

In [ ]:
```
# Question 2
import sympy
for i in range(1,6):
  if not sympy.isprime(i):
    print(i, ': ', i**2)
```

```
1 :  1
4 :  16
```

In [ ]:
```
# Question 3
squares = [i**2 for i in range(1,6)]
for i1,i2 in enumerate(squares):
  print(i1, ': ', i2)
```

```
0 :  1
1 :  4
2 :  9
3 :  16
4 :  25
```

In [ ]:
```
# Question 4
squares = [i**2 for i in range(1,6) if not sympy.isprime(i)]
for i1,i2 in enumerate(squares):
  print(i1, ': ', i2)
```

```
0 :  1
1 :  16
```

In [ ]:
```
# Question 5 (a)
import numpy as np
A = np.array([[1, 2] ,[3, 4], [5, 6]])
B = np.array([[7, 8, 9, 1],[1, 2, 3, 4]])
print(A@B)
```

```
[[ 9 12 15  9]
 [25 32 39 19]
 [41 52 63 29]]
```

In [ ]:
```
# Question 5 (b)
A = np.array([[1, 2] ,[3, 4], [5, 6]])
B = np.array([[3, 2] ,[5, 4], [3, 1]])
print(A*B)
```

```
[[ 3  4]
 [15 16]
 [15  6]]
```

In [ ]:
```
# Question 6
w = np.random.randint(11, size=(5, 7))
print(w)
extw = w[1:3,0:3]
print(extw)
```

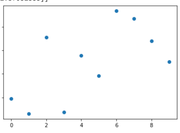
```
[[ 1  7  0  3  7  5  0]
 [ 4  9  8  8  8 10  9]
 [ 0  7  8  0  1  9  4]
 [ 0  2  0  0  9  5  9]
 [ 6  5  3  7  3  7  0]]
[[4 9 8]
 [0 7 8]]
```

In [ ]:
```
# Question 7

print("Example 1") # Example 1
# Add the scalar B to each element of the matrix A
A = np.array([1, 2, 3])
print("A =",A)
B = 2
print("B =",B)
C = A + B
print("C =",C,)

print("\nExample 2") # Example 2
# Add the matrix B to each row of the matrix A
A = np.array([[1, 2, 3], [4, 5, 6]])
print("A =",A)
B = np.array([1, 2, 3])
print("B =",B)
C = A + B
print("C =",C)

print("\nExample 3") # Example 3
#Reshape A and multiply with each column of matrix B
A = np.array([1,2,3])
print("A =",A)
B = np.array([4,5])
print("B =",B)
print(np.reshape(A, (3, 1)) * B)
print("C =",C)
```

```
Example 1
A = [1 2 3]
B = 2
C = [3 4 5]

Example 2
A = [[1 2 3]
 [4 5 6]]
B = [1 2 3]
C = [[2 4 6]
 [5 7 9]]

Example 3
A = [1 2 3]
B = [4 5]
[[ 4  5]
 [ 8 10]
 [12 15]]
C = [[2 4 6]
 [5 7 9]]
```

In [ ]:
```
# Question 8

from numpy import linalg
import matplotlib.pyplot as plt

m,c = 2 ,-4
N=10
x=np.linspace(0,N-1,N).reshape (N, 1 )
sigma = 10
y = m*x + c + np.random.normal(0,sigma, (N, 1))
plt.scatter(x,y)

print("x = ",x)
X=np.append(np.ones((N,1)),x,axis=1)
print("X = ",X)
w=linalg.inv(X.T@ X)@X.T @ y
print("w = ",w)
```

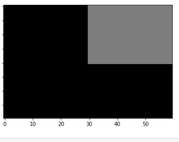
```
x =  [[0.]
 [1.]
 [2.]
 [3.]
 [4.]
 [5.]
 [6.]
 [7.]
 [8.]
 [9.]]
X =  [[1. 0.]
 [1. 1.]
 [1. 2.]
 [1. 3.]
 [1. 4.]
 [1. 5.]
 [1. 6.]
 [1. 7.]
 [1. 8.]
 [1. 9.]]
w =  [[0.34296637]
 [1.57051588]]
```



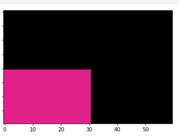
In [ ]:
```
# Question 10
import cv2

img = cv2.imread(r'gal_gaussian.png')
blur = cv2.GaussianBlur(img, (5,5),0)

cv2.namedWindow('Image', cv2.WINDOW_AUTOSIZE)
cv2.imshow('Image', img)
cv2.waitKey(0)
cv2.imshow('Image', blur)
cv2.waitKey(0)
cv2.destroyAllWindows()
```

In [ ]:
```
# Question 11
img = cv2.imread(r'gal_sandp.png')
median = cv2.medianBlur(img, 5)

cv2.namedWindow('Image', cv2.WINDOW_AUTOSIZE)
cv2.imshow('Image', img)
cv2.waitKey(0)
cv2.imshow('Image', median)
cv2.waitKey(0)
cv2.destroyAllWindows()
```

In [ ]:
```
# Question 12

img = np.zeros((40,60), dtype=np.uint8)
img[0:21, 30:61] = 125

fig, ax = plt.subplots()
ax.imshow(img, cmap ='gray', vmin = 0, vmax = 255)
plt.show()
#cv2.namedWindow('Image', cv2.WINDOW_AUTOSIZE)
#cv2.imshow('Image', img)
#cv2.waitKey(0)
#cv2.destroyAllWindows()
```



In [ ]:
```
# Question 13

img = np.zeros((40,60,3), dtype=np.uint8)
img[21:41, 0:31] =  [224, 33, 136]

fig, ax = plt.subplots()
ax.imshow(img)
plt.show()
```



In [ ]:
```
# Question 14
img = cv2.imread(r'tom_dark.jpg')
#median = cv2.medianBlur(img, 5)

value = 60
hsv = cv2.cvtColor(img, cv2.COLOR_BGR2HSV)
h, s, v = cv2.split(hsv)
lim = 255 - value
v[v > lim] = 255
v[v <= lim] += value
final_hsv = cv2.merge((h, s, v))
img2 = cv2.cvtColor(final_hsv, cv2.COLOR_HSV2BGR)

cv2.namedWindow('Image', cv2.WINDOW_AUTOSIZE)
cv2.imshow('Image', img)
cv2.waitKey(0)
cv2.imshow('Image', img2)
cv2.waitKey(0)
cv2.destroyAllWindows()
```